Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

In the Claims:

1.   (Currently Amended) A transcoder, said transcoder comprising:

   a)   a frame buffer;

   b)   an encoder receiving input from said frame buffer;

   c)   a vbv buffer receiving input from said encoder;

   d)   a channel interface receiving input from said vbv buffer;

   e)   a channel rate control connected to said vbv buffer and said channel interface; and

   f)   a transcoder rate control connected to said frame buffer, said encoder, said vbv buffer and said channel rate control, configured to monitor video data in said frame buffer and to monitor the fullness of said vbv buffer.

2.   (Original) The transcoder of claim 1 further comprising a decoder to provide input to said frame buffer.

3.   (Original) The transcoder of claim 1 wherein said channel rate control monitors the fullness of said vbv buffer and controls the output of said vbv buffer to meet a target bit rate in transmitting data to said channel interface.

4.   (Original) The transcoder of claim 3 wherein said transcoder rate control monitors the contents of said frame buffer and said vbv buffer to ensure said vbv buffer does not underflow nor overflow, said transcoder rate control using the results of said monitoring to control the rate at which frames are extracted from said frame buffer, encoded by said encoder and sent to said vbv buffer.

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5. (Original) The transcoder of claim 4 wherein said transcoder rate control utilizes rate reduction means to achieve a target bit rate, said target bit rate being the rate at which data is provided from said vbv buffer to said channel interface.

6. (Original) The transcoder of claim 5 wherein said transcoder rate control further comprises requantization means, said requantization means selectively requantizing the transform coefficients of the macroblocks of a frame based upon image quality degradation.

7. (Original) The transcoder of claim 1, wherein said transcoder rate control modifies the quantizer scale of macroblocks in frames transmitted from said vbv buffer to said channel interface.

8. (Original) The transcoder of claim 1, wherein said transcoder rate control inserts a vbv delay value for frames transmitted by said channel interface.

9. (Previously Presented) A method of controlling the rate of an MPEG video stream to achieve a target bit rate, said method comprising the steps of:

   a) computing a rate reduction factor;

   b) computing a quantizer scale, wherein the rate reduction factor and the quantizer scale are computed using vbv buffer and frame buffer information;

   c) applying the results of steps a) and b) to an encoder to achieve said target bit rate; and

   d) repeating steps a) to c) for a plurality of frames in said video stream.

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10. (Original) The method of claim 9 wherein step a) comprises the steps of:

    i) setting said rate reduction factor to and a rate increase variable to 0;

    ii) adding the size of a current frame in a frame buffer to a total size variable;

    iii) adding the duration of the current frame to a total delays variable;

    iv) calculating a current value of the number of bits in a vbv buffer;

    v) if the current value of the number of bits in the vbv buffer is less than a lower threshold, increasing said rate reduction factor;

    vi) if the current value of the number of bits in the vbv buffer is greater than an upper threshold, increasing said rate increase variable; and

    vii) repeating steps ii) to vi) for a plurality of frames in a said frame buffer.

11. (Original) The method of claim 10 wherein step a) further comprises the steps of:

    viii) calculating a rate reduction factor for the current frame if needed, otherwise setting a value for a channel bit rate.

12. (Original) The method of claim 10 wherein step b) further comprises the steps of:

    i) calculating a cumulative distribution function for each macroblock in a current frame;

    ii) initializing a quantizer multiplier array;

    iii) setting the quantizer scale for each macroblock in the current frame;

    iv) calculating a quantizer multiply for each macroblock in the current frame; and

    vi) setting a quantizer scale code for each macroblock in the current frame.

13. (Previously Presented) A video encoding system, said system accepting as input a source stream and outputting a modified stream, said system comprising means to determine the amount

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of rate reduction necessary to achieve a target bit rate for said modified stream, wherein the amount of rate reduction necessary is determined using vbv buffer and frame buffer information.

14.   (Original) The system of claim 13 further comprising means to compute vbv buffer occupancy and means to compute rate reduction based on said target bit rate.

15.   (Original) The system of claim 14 further comprising means to requantize transform coefficients of the macroblocks in a frame.

16.   (Original) The system of claim 15 wherein said output video stream contains a new quantizer scale for each macroblock of each frame as calculated by said means to requantize.

17.   (Original) The system of claim 14, wherein said system may insert a new vbv delay for each frame contained in said output video stream.

18.   (Previously Presented) A computer readable medium ~~containing~~ including instructions for controlling the rate of an MPEG video stream to achieve a target bit rate, said instructions performing the steps of:

    a)   computing a rate reduction factor;

    b)   computing a quantizer scale, wherein the rate reduction factor and the quantizer scale are computed using vbv buffer and frame buffer information;

    c)   applying the results of steps a) and b) to an encoder to achieve said target bit rate; and repeating steps a) to c) for a plurality of frames in said video stream.

19.   (Original) The medium of claim 18 wherein step a) comprises the steps of:

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i) setting said rate reduction factor and a rate increase variable to 0;

ii) adding the size of a current frame in a frame buffer to a total size variable;

iii) adding the duration of said current frame to a total delays variable;

iv) calculating a current value of the number of bits in a vbv buffer;

v) if the current value of the number of bits in the vbv buffer is less than a lower threshold, increasing said rate reduction factor;

vi) if the current value of the number of bits in the vbv buffer is greater than an upper threshold, increasing said rate increase variable; and

vii) repeating steps ii) to vi) for a plurality of frames in said frame buffer.

20. (Original) The medium of claim 19 wherein step a) further comprises the step of:

viii) calculating a rate reduction factor for said current frame if needed, otherwise setting a value for a channel bit rate.

21. (Original) The medium of claim 18 wherein step b) further comprises the steps of:

i) calculating a cumulative distribution function for each macroblock in a current frame;

ii) initializing a quantizer multiplier array;

iii) setting the quantizer scale for each macroblock in a current frame;

iv) calculating a quantizer multiply for each macroblock in the current frame; and

vi) setting a quantizer scale code for each macroblock in the current frame.

22. (Previously Presented) A system for controlling the rate of an MPEG video stream to achieve a target bit rate, said system comprising:

a) means for computing a rate reduction factor;

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b)   means for computing a quantizer scale, wherein the rate reduction factor and the quantizer scale are computed using vbv buffer and frame buffer information;

c)   means for applying the results of steps a) and b) to an encoder to achieve said target bit rate.

23.   (Original) The system of claim 22 wherein means for computing a rate reduction factor comprises:

i)   means for setting said rate reduction factor and a rate increase variable to 0;

ii)   means for adding the size of a current frame in a frame buffer to a total size variable;

iii)   means for adding the duration of the current frame to a total delays variable;

iv)   means for calculating a current value of the number of bits in a vbv buffer;

v)   means for increasing said rate reduction factor if the current value of the number of bits in the vbv buffer is less than a lower threshold; and

vi)   means for increasing said rate increase variable if the current value of the number of bits in the vbv buffer is greater than an upper threshold.

24.   (Original) The system of claim 23 wherein said means for computing a rate reduction factor further comprises:

vii)   means for calculating a rate reduction factor for said current frame if needed, otherwise setting a value for a channel bit rate.

25.   (Original) The system of claim 22 wherein said means for computing a quantizer scale comprises:

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i)   means for calculating a cumulative distribution function for each macroblock in a current frame;

ii)   means for initializing a quantizer multiplier array;

iii)   means for setting the quantizer scale for each macroblock in the current frame;

iv)   means for calculating a quantizer multiply for each macroblock in the current frame; and

vi)   means for setting a quantizer scale code for each macroblock in the current frame.

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